Sulfides, Redox and Sediment Visual Observations based on a Monitoring Program in Various Estuaries along the East Coast of New Brunswick between 2006 and 2010.

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E1C 9B6

2011

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ABSTRACT

Robichaud, G and S. Doiron, 2011. Sulfides, Redox and Sediment Visual Observations based on a Monitoring Program in Various Estuaries along the East Coast of New Brunswick between 2006 and 2010. Can. Data Rep. Fish. Aquat. Sci. 1233: vi + 39 p.

In 2007, an environmental assessment for Water Column Oyster Aquaculture in New Brunswick was completed under the Canadian Environmental Assessment Act (CEAA). Marine sediment was identified as a Valuable Ecosystems Component (VEC). A marine sediment quality sampling was established using the boundaries of Oyster Aquaculture Management Plan developed for each estuary in New Brunswick as the sampling grid. Measurements of total sulphides and of oxidation-reduction potentials (Eh) in porewater have been used to determine the organic enrichment gradient of the sediment in various estuaries along the east coast of New Brunswick between 2006 and 2010.

Key words: Sulphide, Redox, Estuaries in New Brunswick.

RÉSUMÉ

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En 2007, une évaluation environnementale sur l'ostréiculture dans la colonne d'eau au Nouveau-Brunswick a été faite tel qu'elle est prescrite par la Loi canadienne sur l'évaluation environnementale. Le sédiment marin a été identifié comme étant une Composante Environnementale Valorisée (CEV). Un suivi sur la qualité des sédiments marins a été conçu en utilisant comme grille d'échantillonnage les plans de gestion pour l'élevage des huîtres au Nouveau Brunswick. Des mesures de sulfides totaux et du potentiel d'oxido-réduction (Eh) dans les eaux interstitielles ont été utilisées pour déterminer le gradient d'enrichissement organique du sédiment dans différents estuaires le long de la côte est du Nouveau Brunswick entre 2006 et 2010.

Mots clés : Sulphide, Redox, Estuaires au Nouveau Brunswick.

1.0 INTRODUCTION

In 2007, the Canadian Environmental Assessment Agency (the Agency) declared the report entitled *Replacement Class Screening Report for Water Column Oyster Aquaculture in New Brunswick* to be a replacement class screening report (RCSR) pursuant to the provisions of subsection 19(1) and 19(2)(a) of the *Canadian Environmental Assessment Act* (CEAA).

Due to the environmental assessment process of the CEAA. this replacement class screening report required the establishment of a project's scope (which includes the determination of an environmental boundary), identification of valuable ecosystem components (VEC) and assessment of these for potential environmental effects. The New Brunswick Oyster Aquaculture Management Plan in order to set the boundaries of the environmental assessment and therefore the scope of the project (CANADA TRANSPORT CANADA, 2007).

The above mentioned report has identified, among others, marine sediment as being one of the VEC. The report states that one potencial consequence that could affect marine sediment is that oyster rearing activity could potentially concentrate organic matter (biodeposits, shell debris and epibionts) locally under the culture area and could have an effect on the quality of the sediment. (CANADA TRANSPORT CANADA, 2007).

In order to set a baseline data on marine sediment quality, a one year monitoring program for each estuary took place in 10 different bays along the East Coast of New Brunswick between 2006 and 2010 (Figure 1). Measurements of total sulphides in the marine surface sediment and oxidation-reduction potentials (redox; Eh) in porewater were collected to determine the organic enrichment gradient of the sediment (Whitfield, 1971).

The sulfides, redox, adjusted redox and sediment visual observations data collected for each of the estuary monitored along the East Coast of New Brunswick between 2006 and 2010 are presented in this report.

2.0 MATERIAL AND METHODS

For the purpose of this survey, being set baseline data on the organic enrichment gradient of the sediment (Whitfield, 1971), sediment samples and underwater videos were randomly collected in 10 bays along the East Coast of New Brunswick (Figure 1). The sampling was undertaken between 2006- to 2010 and utilized the New Brunswick Oyster Aquaculture Management Plan as the geographical grid framework for the sampling

2.1 SAMPLING DESIGN

The proposed sampling design consisted of one randomly located sample within a 300 by 300 meter grid. Samples which located over land or outside the aquaculture management plan were dropped. The number of available samples in a particular bay was usually larger than the available resources necessary for full coverage, so the sample locations were randomly sorted and then chosen sequentially until the maximum number of samples possible with the available resources was reached.

A list of sampling points (Latitude/ Longitude coordinate) was randomly generated in a descending order. From that list, it was recommended that the first 30 stations as a minimum be sampled (Appendix A).

Based on the sampling list, sulphides, redox and adjusted redox have been collected using the Whitfield et al 1992 sediment characterization methodology. Underwater videos and the sediment visual observations data were also collected. (Appendices A, B, C, D).

2.2 SEDIMENT COLLECTION- UNDERWATER VIDEO / SULFIDE (S) AND REDOX (Eh) DATA ANALYSIS

The sediment collection for the sulfide and redox data analysis was done with the same methodology used during a survey undertaken in Lameque Bay, N.B. between 2001 and 2007 (Plante, F. and S.C. Courtenay, 2008). The methodology is described in the following sections.

Measurements of total sulfide in surface sediment and oxidation-reduction potentials (redox; Eh) in porewater were collected to determine organic enrichment content of the sediment (Whitfield, 1971). Redox and sulphide were selected as the most cost-effective monitor of the sedimentary environment (Wildish *et al.*, 2001) to determine whether decreased levels of dissolved oxygen and increased levels of sulphide in porewater had occurred. The organic enrichment gradient zones (Table 1) proposed by Wildish *et al.* (1999) were used to group and analyse redox and sulphide readings. Redox (Eh) readings are expressed in mV relative to normal hydrogen electrode (NHE) and sulphide (S) readings are expressed in µM.

Table 1: Organic enrichment gradient zones based on Redox (Eh) and reduced Sulfides (S 2-) (Modified from Wildish *et al.* 1999)

Criteria	*Normal*	*Oxic*	*Hypoxic*	*Anoxic*
Redox (Eh NHE)	(mV) > 100	100 to 0	0 to -100	< -100
Sulfide (S 2- (µM))	< 300	300 to 1 300	1 300 to 6 000	> 6 000

2.2.1 SEDIMENT COLLECTION - UNDERWATER VIDEO

Dominator Marine Services Inc., P.O. Box 6191, Saint John, New Brunswick, E2L 4R6, was contracted for the field sampling and laboratory analyses. A total of one sample was collected at every station by a scuba diver using 35 cm lexan core tubes (5 cm inside diameter, drilled at 2 cm intervals and sealed with duct tape) inserted vertically into the substrate under constant pressure. Once a representative sample was retrieved, the core tube was capped at each end and returned to the surface where each sample set was videotaped and prepared for sediment analysis.

For each of the sampling sites, an underwater video took visual observations of the bottom conditions. The videos were digitized on Compact Disk (CD) and are included in this report (Appendix D).

2.2.2 SULPHIDE ANALYSIS

For sulphide analysis, a 5 ml sediment sub-sample was collected from the top 2 cm of each core immediately after redox analysis. The 5 ml sub-sample was analyzed immediately or stored on ice in an air-tight container with no head-space and analyzed within 72 hours. Sulphide measurements were taken with a calibrated Thermo Orion Silver/Sulphide electrode (model 9616). Each sub-sample was mixed with 5 ml of a solution of L-ascorbic acid and sulphide antioxidant buffer (SAOB) prepared within the past 3 hours. Once the solution of L-ascorbic acid and SAOB were mixed with the sub-sample, the sample was brought to the same temperature at which the electrode was calibrated, and then the sulphide was measured once the value has stabilized or within 2 minutes. The sulphide electrode was rinsed with distilled water and dried between measurements.

2.2.3 SULPHIDE ELECTRODE CALIBRATION

The sulphide electrode was filled with Orion Optimum Results B (cat. No. 900062) at least 24 hours before use. Three sulphide standards were used for calibration (100 µM, 1000 µM and 10000 µM). The 10000 µM sulphide standard was prepared using de-aerated water and stored in the dark, bottled under nitrogen, and opened immediately before use. The temperature of the sulphide standards had been brought to the same temperature as the samples when analyzed. Regardless of the number of samples analyzed, the calibrated

sulphide electrode was used for a maximum of 3 hours from the time of first measurement. Then, the electrode was recalibrated before further readings were taken.

2.2.4 REDOX ANALYSIS

Redox measurements were taken with a Hanna electrode (part no. HI3230B). Redox measurements were made within 2 hours of sample collection or within 24 hours if samples were stored in an ice-bath. One redox measurement of each core sample was taken by inserting the electrode through the tape into the hole closest to the sediment-water interface, within the top 2 cm of sample, and twisting the electrode between the thumb and forefinger. The temperature of each sample was measured and recorded. Redox measurements were recorded as millivolts relative to the normal hydrogen electrode (mVNHE) using the equation mVNHE=Eo+(224-T), where Eo=mV of unknown and T=temperature of unknown (oC) or as millivolts (mV), once the value has stabilized (drift < 10 mV/minute) or 2 minutes after commencement of measurement. The redox electrode was rinsed with distilled water and dried between measurements.

2.2.5 REDOX ELECTRODE ACCURACY CHECK

The accuracy of the redox electrode was checked using the Hanna 240 mV test solution (part no. HI7021), in which the electrode should read between 220-260 mV. Hanna pre-treatment oxidizing (part no. HI7091) and reducing (part no. HI7092) solutions were used to adjust the accuracy of the redox electrode within the recommended acceptable range.

3.0 DATA PRESENTATION

The complete data sets are presented in appendices A, B, C and D.

Appendix A are tables that include the geographic positions, the redox, adjusted redox, sulfide results and the visual observations collected for each estuaries sampled.

Appendix B are maps from various bays sampled (figure1). It includes the sampling site locations and the sulfide results. Points are colored to represent the sediment quality result based on the sulphide organic enrichment gradient zones (Table 1) Wildish *et al.* (1999).

Appendix C are maps from various bays sampled (figure1 It includes the sampling site locations and the adjusted redox results. Points are colored to represent the sediment quality result based on the redox organic enrichment gradient zone (Table 1) Wildish *et al.* (1999).

Appendix D are CD's containing underwater videos of each sites sampled from various bays (figure 1). It includes visual observations of the on bottom site sampled.

4.0 ACKNOWLEDGEMENTS

The authors would like to thank the New Brunswick Department of Agriculture, Aquaculture and Fisheries to have paid for this survey over the years.

Dominator Marines Services who has undertaken the sampling and the laboratory analysis.

Brad Firth from DFO/Habitat Protection and Sustainable Development for his help provided for the development of maps included in this document.

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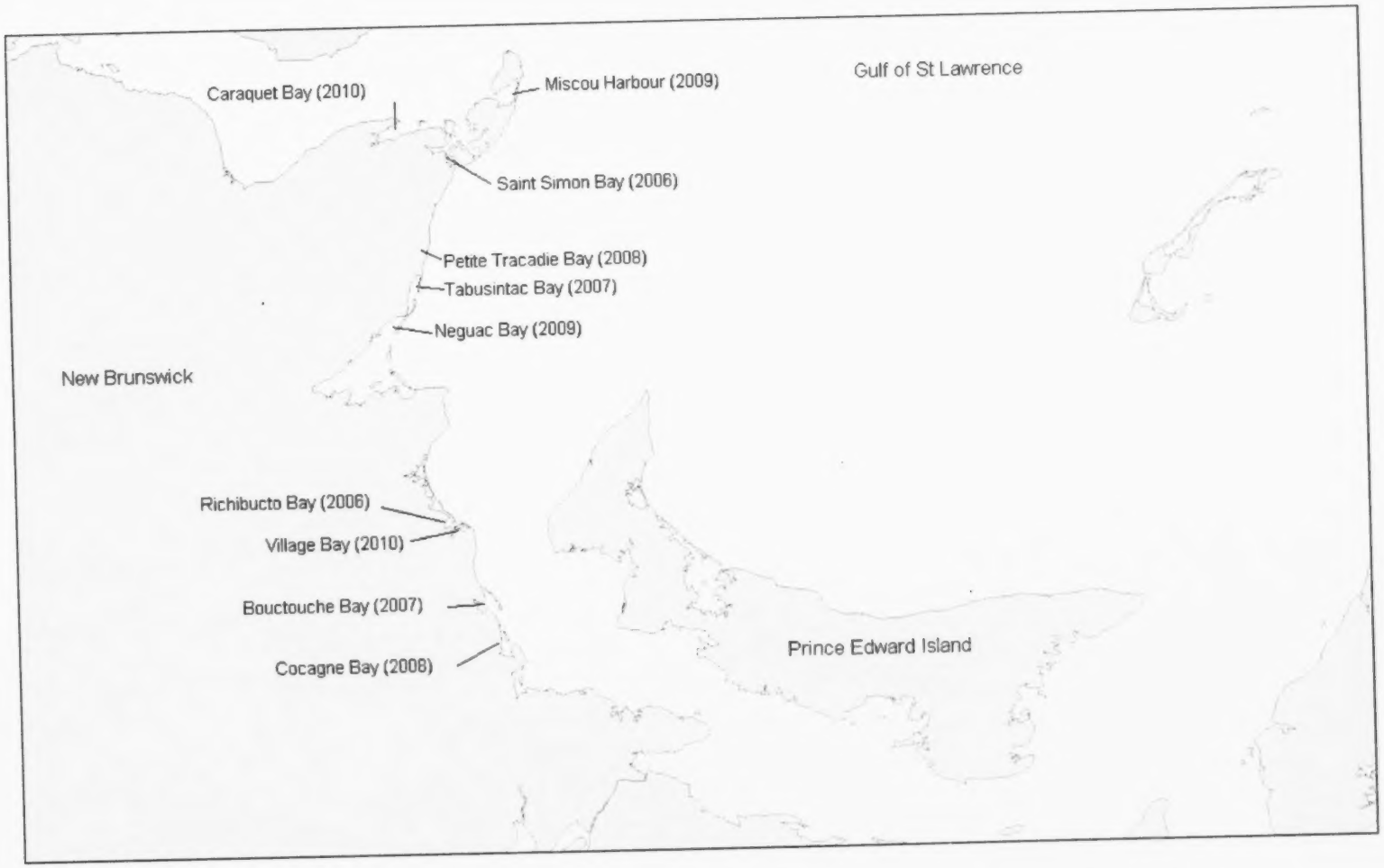

Figure 1. Location of the estuaries monitored for sulfide and redox along the East Coast of New Brunswick between 2006 and 2010.

Appendix A. Summary tables of the sediment chemistry and characterization results.

Miscou Harbour, N.B. 7

Caraquet Bay, N.B. 8

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Village Bay, N.B. 14

Bouctouche Bay, N.B. 15

Cocagne Bay, N.B. 16

SEDIMENT SAMPLE RESULTS

SITE: Miscou Harbour, NB
DATE: July 24,2009

TIME COLLECTION: 09:00-17:30
TIME ANALYSIS: Eh) 09:30-18:00, S) 07:00-09:00 (July 25, 09)

Sample Station	Position NAD 83 (.DDD)	Redox (mV)	Redox Adjusted	Sulfide (µM)	Underwater Video Visual Observations Summary
1	47.9179 / 64.5113	-172	33.00	104.0	Silt, sand, brown, grey, eelgrass
2	47.8743 / 64.5326	-37	168.00	34.1	Silt, sand, brown
3	47.9042 / 64.5569	-50	155.00	61.5	Sand, silt, brown, eelgrass
4	47.9211 / 64.5038	-115	90.00	117.0	Silt, sand, brown, eelgrass
5	47.9077 / 64.5535	-82	123.00	42.8	Silt, sand, brown, eelgrass
6	47.8998 / 64.5101	-138	67.00	81.4	Silt, sand, brown
7	47.9317 / 64.5032	-140	65.00	70.9	Silt, sand, brown, eelgrass
8	47.8713 / 64.5573	-188	17.00	37.3	Silt, sand, brown, eelgrass
9	47.9357 / 64.4984	-216	-11.00	168.0	Silt, sand, brown, eelgrass
10	47.9039 / 64.5607	-55	150.00	56.8	Silt, sand, brown, eelgrass
11	47.9203 / 64.5219	-164	41.00	122.0	Silt, sand, brown, eelgrass
12	47.8956 / 64.5133	-45	160.00	9.0	Sand, silt, brown
13	47.8964 / 64.5695	-74	131.00	40.1	Sand, silt, brown, eelgrass
14	47.8676 / 64.5579	-196	9.00	29.2	Silt, sand, brown, eelgrass
15	47.8718 / 64.5340	-95	110.00	10.2	Sand, silt, brown
16	47.9203 / 64.5135	-241	-36.00	214.0	Silt, sand, grey, eelgrass
17	47.9159 / 64.5255	-130	75.00	134.0	Silt, sand, brown, eelgrass
18	47.9091 / 64.5468	-184	21.00	138.0	Silt, sand, brown, grey, eelgrass
19	47.9145 / 64.5339	-117	88.00	81.6	Sand, silt, brown, eelgrass
20	47.8799 / 64.5707	-16	189.00	3.1	Sand, brown
21	47.8765 / 64.5654	-116	89.00	14.1	Silt, sand, brown, grey, eelgrass
22	47.9231 / 64.5046	-168	37.00	81.4	Silt, sand, brown, eelgrass
23	47.9131 / 64.5362	-120	85.00	109.0	Sand, silt, brown, eelgrass
24	47.8745 / 64.5187	-138	67.00	117.0	Sand, silt, grey
25	47.8984 / 64.5045	-189	16.00	109.0	Silt, sand, brown
26	47.9196 / 64.4991	-151	54.00	62.1	Sand, silt, brown, eelgrass
27	47.9232 / 64.5119	-146	59.00	128.0	Silt, sand, brown, eelgrass
28	47.8808 / 64.5646	-24	181.00	1.9	Sand, brown
29	47.8944 / 64.5101	-169	36.00	135.0	Silt, sand, brown, grey, eelgrass
30	47.9027 / 64.5622	-138	67.00	125.0	Sand, silt, brown, eelgrass

Calibration Log: Redox meter: July 24, 2009, 19:30, 241 mv / July 25, 2009, 19:00, 236mv / Sulfide meter: July 22, 2009, 10:32, 22.9°C (AP-125)
Sample Temperature 19°C

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	67.8107/ 64.9988	-940	64	5070	Brown, Grey, Silt, Easily, Disturbed, Eelgrass
27	67.7775/ 65.0105	-190	14	1460	Grey, Brown, Silt, Easily, Disturbed
28	67.8206/ 64.9864	-153	51	2290	Brown, Grey, Silt, Sand, Easily, Disturbed
29	67.7869/ 65.0338	-145	59	1940	Brown, Grey, Silt, Easily, Disturbed

Calibration Log: Redox meter: July 30, 2010, 19:30, 243 mV; Ionic meter: July 29, 2010, 09:15, 24.8°C (AP-125); Sample Temperature, 20°C

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	47.7403 / 64.8562	8.2	-57	25400	21.6	Brown, fine, coarse, very slight H2S
25	47.7736 / 64.7628	3.2	-137	8000	369.8	Brown, grey, fine, very slight H2S
26	47.7871 / 64.7881	3.0	-263	14400	416.0	Brown, grey, fine, very slight H2S
27	47.7187 / 64.7818	3.1	-200	17300	431.0	Brown, grey, fine, cobble, very slight H2S
28	47.7537 / 64.7801	2.9	-57	16000	226.0	Brown, grey, fine, very slight H2S
29	47.7165 / 64.7691	3.8	-186	3100	385.0	Brown, fine, no odor
30	47.7463 / 64.8456	4.5	-130	8700	125.0	

Calibration Log: Redox meter: November 10, 2000, 21.1°C 239mv / Sulfide meter: November 9, 2000, 23.9°C
Sample Temperature 7°C

SEDIMENT SAMPLE RESULTS

SITE: Petite Tracadie Bay, NB
DATE: July 31,2008

TIME COLLECTION: 09:30-16:00
TIME ANALYSIS: Eh) 10:00-16:30, S) 18:00-20:00

Sample Station *	Position NAD 83 (.DDD)	Depth (m)	Redox (mV)	Redox Adjusted	Sulfide (µM)	Underwater Video Visual Observations Summary
1	47.5484 / 64.9045	1.0	-206	-2.00	226.0	Grey, fine
2	47.5597 / 64.8957	1.2	-313	-109.00	916.0	Grey, fine
3	47.5540 / 64.8959	1.2	-190	14.00	138.0	Grey, brown, fine
6	47.5483 / 64.8961	1.5	38	242.00	40.5	Brown, fine
8	47.5426 / 64.8962	1.0	-226	-22.00	210.0	Grey, fine
9	47.5369 / 64.8964	0.7	-27	177.00	36.2	Brown, coarse, fine
11	47.5312 / 64.8966	0.0	-38	166.00	1.25	Brown, coarse, fine
12	47.5709 / 64.8870	0.2	-268	-64.00	1520.0	Grey, black, fine
13	47.5595 / 64.8873	1.2	-167	37.00	79.2	Brown, grey, fine, coarse
14	47.5306 / 64.8880	0.8	-290	-86.00	1110.0	Grey, brown, fine
15	47.5311 / 64.8882	1.5	-193	11.00	221.0	Grey, brown, fine
16	47.4629 / 64.8902	1.1	-154	50.00	116.0	Brown, grey, fine, coarse
17	47.5765 / 64.8784	0.6	-296	-92.00	718.0	Grey, black, fine
18	47.5708 / 64.8786	1.2	-284	-80.00	410.0	Grey, fine
19	47.5621 / 64.8787	0.4	-262	-58.00	308.0	Grey, brown, fi
20	47.5821 / 64.8698	1.0	-61	143.00	64.3	Brown, grey, fine
21	47.5764 / 64.8700	1.1	-189	15.00	216.0	Brown, grey, fine
22	47.5819 / 64.8614	1.1	-151	53.00	84.4	Brown, grey, fine
23	47.5569 / 64.9033	0.9	3	207.00	26.1	Brown, grey, fine , coarse
24	47.5512 / 64.9044	1.0	-327	-123.00	525.0	Grey, fine
25	47.5568 / 64.8958	1.3	2	206.00	17.6	Brown, fine
28	47.5511 / 64.8960	1.2	-210	-6.00	185.0	Grey, brown, fine
30	47.5454 / 64.8962	1.5	-33	171.00	76.2	Brown, grey, fine
35	47.5624 / 64.8872	1.2	-26	178.00	14.4	Brown, grey, fine
43	47.5792 / 64.8699	1.0	-291	-87.00	420.0	Grey, brown, fine
45	47.5735 / 64.8701	1.2	-273	-69.00	278.0	Grey, fine
79	47.5397 / 64.8921	1.2	-168	36.00	96.4	Brown, fine
81	47.5340 / 64.8923	1.2	-241	-37.00	375.0	Grey, brown, fine
82	47.5283 / 64.8925	1.2	-161	43.00	101.0	Brown, grey, fine
84	47.5608 / 64.8829	1.2	-231	-27.00	256.0	Grey, brown, fine

Calibration Log: Redox meter: July 31, 2008, 10:00, 238 mv / Sulfide meter: July 29, 2008, 11:30, 23.8°C (AP-63)
Sample Temperature 20°C

** Sample Station located on land or outside New Brunswick Aquaculture ManagementPlan were deleted from the ramdom list*

SEDIMENT SAMPLE RESULTS

SITE: Tabusintac Bay, NB
DATE: July 27,2007

TIME COLLECTION: 09:00-17:00 (July 27)
TIME ANALYSIS: Eh) 09:10-17:10 S) 19:00-22:00 (July 27)

Sample Station	Position NAD 83 (.MMM)	Depth (m)	Redox (mV)	Redox Adjusted	Sulfide (µM)	Underwater Video Visual Observations Summary
1	47.3246 / 64.9534	1.8	-58	144.00	78.5	Brown, grey, fine, coarse, no odor
2	47.3333 / 64.949	2.1	-106	96.00	222.0	Brown, grey, fine, coarse, no odor
3	47.3476 / 64.9501	0.9	-138	64.00	108.0	Brown, grey, fine, coarse, no odor
4	47.3324 / 64.9546	0.9	-159	43.00	145.0	Brown, grey, fine, coarse, no odor
5	47.355 / 64.9425	1.2	-8	194.00	26.8	Brown, fine, coarse
6	47.3133 / 64.9571	1.5	-111	91.00	167.0	Brown, grey, fine, coarse, no odor
7	47.3586 / 64.943	1.5	-152	50.00	255.0	Grey, brown, fine, very slight H2S
8	47.3228 / 64.9574	1.2	-133	69.00	158.0	Brown, grey, fine, no odor, coarse
9	47.3263 / 64.9589	0.0	30	232.00	3.5	Brown, coarse, no odor
10	47.3068 / 64.957	0.3	-216	-14.00	829.0	Grey, black, fine, slight H2S
11	47.3719 / 64.9387	1.2	-135	67.00	136.0	Brown, grey
12	47.3586 / 64.9393	1.2	-256	-54.00	768.0	Grey, black, fine, H2S
13	47.3385 / 64.96	0.9	-91	111.00	138.0	Brown, grey, fine, no odor
14	47.3149 / 64.9623	0.9	-166	36.00	364.0	Grey, fine, very slight H2S
15	47.3449 / 64.9602	0.9	-137	65.00	81.2	Brown, grey, fine
16	47.3361 / 64.9554	0.6	-78	124.00	216.0	Brown, grey, fine, coarse, no odor
17	47.3155 / 64.9575	1.5	-175	27.00	159.0	Brown, grey, fine, coarse
18	47.3573 / 64.9468	1.2	-228	-26.00	978.0	Grey, black, fine, H2S
19	47.3722 / 64.9352	0.9	-149	53.00	494.0	Grey, fine, slight H2S
20	47.3176 / 64.9581	1.2	-59	143.00	106.0	Brown, grey, fine, coarse, no odor
21	47.3032 / 64.9462					
22	47.3254 / 64.9595	0.0	17	219.00	1.8	Brown, coarse, no odor
23	47.3667 / 64.9378	1.2	-205	-3.00	381.0	Grey, fine, slight H2S
24	47.3233 / 64.9563	1.8	-89	113.00	117.0	Brown, grey, fine, coarse, no odor
25	47.3048 / 64.9491					
26	47.3631 / 64.9393	1.2	-95	107.00	81.4	Brown, grey, fine
27	47.3139 / 64.9604	1.2	-206	-4.00	694.0	Grey, black, fine, H2S
28	47.3746 / 64.937	0.9	-186	16.00	414.0	Grey, fine, slight H2S
29	47.346 / 64.9599	0.9	-51	151.00	96.3	Brown, grey, fine, coarse, no odor
30	47.3436 / 64.9525	1.2	-27	175.00	43.8	Brown, coarse, no odor

Calibration Log: Redox meter: July 27, 2007, 07:00, 239mv / Sulfide meter: July 24, 2007, 10:00, 23.5°C
Sample Temperature 22°C

SEDIMENT SAMPLE RESULTS

SITE: Neguac Bay, NB

DATE: July 25-26, 2009

TIME COLLECTION: 12:00-18:00 (July 25) / 10:30-13:00 (July 26)
TIME ANALYSIS: Eh) 12:30-18:15 (July 25), 11:00-13:15 (July 26)

TIME ANALYSIS: S) 19:00-21:00 (July 27)

Sample Station	Position NAD 83 (.DDD)	Redox (mV)	Redox Adjusted	Sulfide (µM)	Underwater Video Visual Observations Summary
1	47.2748 / 65.0146	-277	-72.00	415.0	Silt, sand, grey
2	47.2773 / 65.0157	-26	179.00	49.1	Sand, brown, grey
3	47.2791 / 64.9972	-198	7.00	627.0	Silt, sand, brown, grey, eelgrass
4	47.2616 / 65.0300	-241	-36.00	711.0	Silt, sand, grey, shell debris
5	47.2779 / 65.0136	-18	187.00	25.7	Sand, brown
6	47.2457 / 65.0689	-195	10.00	426.0	Silt, sand, brown, grey, eelgrass
7	47.2561 / 65.0474	-214	-9.00	448.0	Silt, grey
8	47.2289 / 65.0866	-214	-9.00	552.0	Silt, sand, grey, eelgrass
9	47.2519 / 65.0599	-119	86.00	175.0	Silt, sand, brown, grey, eelgrass
10	47.2607 / 65.0417	-195	10.00	524.0	Silt, sand, brown, grey
11	47.2655 / 65.0200	-186	19.00	134.0	Sand, silt, brown, grey
12	47.2354 / 65.0845	-236	-31.00	450.0	Silt, sand, grey, shell debris, eelgrass
13	47.2602 / 65.0480	-88	117.00	45.2	Sand, silt, brown, grey
14	47.2509 / 65.0685	-220	-15.00	670.0	Silt, sand, brown, grey, eelgrass
15	47.2656 / 65.0270	-261	-56.00	685.0	Silt, sand, grey
16	47.2312 / 65.0808	-245	-40.00	486.0	Silt, sand, grey, eelgrass
17	47.2309 / 65.0646	63	268.00	1.7	Sand, silt, brown
18	47.2617 / 65.0330	-259	-54.00	462.0	Silt, sand, brown, grey
19	47.2802 / 64.9905	-245	-40.00	945.0	Silt, sand, grey, eelgrass
20	47.2758 / 64.9911	-216	-11.00	711.0	Silt, sand, grey, eelgrass
21	47.2737 / 65.0078	-115	90.00	106.0	Sand, silt, brown
22	47.2596 / 65.0374	-204	1.00	386.0	Silt, sand, brown, grey
23	47.2422 / 65.0419	38	243.00	28.9	Sand, silt, brown
24	47.2588 / 65.0138	-246	-41.00	649.0	Silt, sand, grey, H2S
25	47.2383 / 65.0756	-196	9.00	271.0	Silt, sand, brown, grey
26	47.2571 / 65.0538	-356	-151.00	9100.0	Silt, black, grass, H2S
27	47.2333 / 65.0842	-281	-76.00	631.0	Silt, sand, grey, eelgrass
28	47.2457 / 65.0316	78	283.00	34.2	Sand, silt, brown
29	47.2355 / 65.0778	-45	160.00	79.3	Silt, sand, brown, grey
30	47.2604 / 65.0293	-256	-51.00	401.0	Silt, sand, grey

Calibration Log: Redox meter: July 24, 2009, 19:30, 241 mv / July 25, 2009, 19:00, 236mv / Sulfide meter: July 22, 2009, 10:32, 22.9°C (AP-125)

Sample Temperature 19°C

SEDIMENT SAMPLE RESULTS

SITE: Richibucto Bay, NB
DATE: November 9 and 10, 2006

TIME COLLECTION: 13:30-16:30 (Nov 9) / 09:30-16:00 (Nov 10)
TIME ANALYSIS: Eh) 14:00-17:00 (Nov 9) / 10:00-16:30 (Nov 10)
TIME ANALYSIS: S) 17:00-20:00 (Nov 10)

Sample Station	Position NAD 83 (.MMM)	Depth (m)	Redox (mV)	Redox Adjusted	Sulfide (µM)	Underwater Video Visual Observations Summary
1	46.6798 / 64.7608	2.0	-86	130.00	35.1	Brown, fine, no odor
2	46.7058 / 64.8588	1.1	-185	31.00	396.0	Brown, black, fine, slight H2S
3	46.6859 / 64.8501	2.1	-52	164.00	70.8	Brown, fine, coarse, no odor
4	46.7077 / 64.8378	0.5	72	288.00	8.4	Brown, coarse, no odor
5	46.7053 / 64.8530	1.2	-94	122.00	181.0	Brown, fine, coarse, very slight H2S
6	46.6915 / 64.8101	0.3	65	281.00	12.4	Brown, coarse, no odor
7	46.7236 / 64.9016	1.2	-156	60.00	228.0	Grey, fine, very slight H2S
8	46.7173 / 64.8916	3.8	-110	106.00	186.0	Grey, fine, very slight H2S
9	46.7213 / 64.9018	1.0	-13	203.00	41.9	Brown, grey, fine, no odor
10	46.7196 / 64.8749	3.0	-160	56.00	429.0	Grey, fine, slight H2S
11	46.6930 / 64.8442	2.1	-24	192.00	6.2	Brown, coarse, no odor
12	46.7133 / 64.8217	0.6	25	241.00	20.6	Brown, coarse, no odor
13	46.6751 / 64.7660	1.4	-105	111.00	142.0	Brown, fine, coarse
14	46.6897 / 64.8563	1.4	-136	80.00	484.0	Brown, black, fine, slight H2S
15	46.705 / 64.8405	1.2	-11	205.00	46.1	Brown, fine, coarse, no odor
16	46.6892 / 64.8465	5.5	-67	149.00	105.0	Brown, fine, coarse, no odor
17	46.7060 / 64.8698	1.2	-113	103.00	50.9	Brown, fine, coarse, no odor
18	46.7053 / 64.8345	1.8	-106	110.00	128.0	Brown, grey, fine, no odor
19	46.7204 / 64.9093	1.6	-25	191.00	47.8	Brown, grey, fine, no odor
20	46.6864 / 64.7559	2.2	-40	176.00	66.7	Brown, fine, coarse, no odor
21	46.7032 / 64.8534	4.1	-74	142.00	46.2	Brown, fine, coarse, no odor
22	46.6903 / 64.7545	1.5	30	246.00	56.1	Brown, fine, coarse, no odor
23	46.7178 / 64.8818	4.5	-213	3.00	1165.0	Grey, black, fine, H2S
24	46.6902 / 64.8405	2.6	-43	173.00	48.9	Brown, fine, no odor
25	46.6809 / 64.7626	2.1	-63	153.00	132.0	Brown, grey, fine, no odor
26	46.6781 / 64.7721	1.1	-18	198.00	103.0	Brown, grey, fine, no odor
27	46.7135 / 64.8167	1.2	-46	170.00	88.0	Brown, fine, no odor
28	46.6946 / 64.8214	2.6	-38	178.00	98.2	Brown, fine, no odor
29	46.7132 / 64.8605	10.0	-136	80.00	186.0	Brown, grey, fine, very slight H2S
30	46.7070 / 64.8205	1.1	-108	108.00	164.0	Brown, grey, fine, no odor

Calibration Log: Redox meter: November 8, 2006, 19:00 243mv / November 9, 2006, 20:00, 238mv / Sulfide meter: November 9, 2006, 23.9°C
Sample Temperature 8°C

SEDIMENT SAMPLE RESULTS

SITE: Village Bay, NB
DATE: July 30, 20

TIME COLLECTION: 08:00-17:30
TIME ANALYSIS: Eh) 08:30-18:00 (July 30)
TIME ANALYSIS: S) 07:00-09:00 (August 1)

Sample Station	Position NAD 83 (.DDD)	Redox (mV)	Redox Adjusted	Sulfide (µM)	Underwater Video Visual Observations Summary
1	46.6798/ 64.7608	-219	-17	446	Grey, Silt, Easily, Disturbed
13	46.6751/ 64.7660	-55	147	211	Grey, Brown, Silt, Sand, Easily, Disturbed
20	46.6864/ 64.7559	-168	34	191	Grey, Brown, Silt, Sand, Easily, Disturbed
22	46.6903/ 64.7545	-9	193	146	Grey, Brown, Silt, Sand, Easily, Disturbed, Eelgrass
25	46.6809/ 64.7626	-202	0	597	Grey, Silt, Easily, Disturbed
26	46.6781/ 64.7721	-158	44	391	Grey, Brown, Silt, Easily, Disturbed
40	46.6869/ 64.7596	-161	41	273	Grey, Silt, Sand, Easily, Disturbed
41	46.6905/ 64.7660	11	213	10.5	Grey, Brown, Sand, Silt, Semi-Firm
48	46.6878/ 64.7650	-81	121	11.6	Brown, Sand, Semi-firm
50	46.6820/ 64.7681	-180	22	410	Grey, Brown, Silt, Easily, Disturbed
56	46.6961/ 64.7558	-155	47	261	Brown. Grey, Silt, Sand, Easily , Disturbed
58	46.6931/ 64.7525	-95	107	75.7	Brown, Grey, Sand, Silt, Semi-firm
60	46.6834/ 64.7579	-132	70	240	Brown, Grey, Sand, Silt, Easily, Disturbed
61	46.6815/ 64.7589	-248	-46	1870	Grey, Silt, Easily, Disturbed
66	46.6779/ 64.7699	-156	46	224	Grey, Brown, Silt, Sand, Easily, Disturbed
67	46.6892/ 64.7503	-16	186	113	Brown, Sand, Silt, Easily, Disturbed
70	46.6754/ 64.7671	-202	0	360	Brown, Grey, Silt, Sand, Easily, Disturbed
74	46.6786/ 64.7636	-24	178	112	Brown, Grey, Sand, Silt, Easily, Disturbed, Shell, Debris, Macroalga, Debris
76	46.6847/ 64.7666	-236	-34	981	Grey, Silt, Easily, Disturbed
77	46.6767/ 64.7599	-206	-4	316	Brown, Grey, Silt, Sand, Easily, Disturbed
78	46.6841/ 64.7643	-191	11	388	Grey, Silt, Sand, Easily, Disturbed
80	46.6922/ 64.7575	-20	182	124	Brown, Grey, Sand, Silt, Easily, Disturbed, Eeelgrass
86	46.6861/64.7504	-62	140	28.2	Brown, Sand, Semi-firm, Shell Debris
93	46.6904/ 64.7610	-226	-24	1070	Grey, Brown, Silt, Sand, Easily, Disturbed
99	46.6831/ 64.7624	-110	92	299	Grey, Brown, Silt, Sand, Easily, Disturbed

Calibration Log: Redox meter: July 20, 2010, 19:30, 235 mv / Sulfide meter: July 29, 2010, 09:15, 24.8°C (AP-125)
Sample Temperature 22°C

SEDIMENT SAMPLE RESULTS

SITE: Belcoucha Bay, NB

DATE: July 30, 2009

TIME COLLECTION: 10:00-16:30

TIME ANALYSIS: Eh) 10:30-17:00; S) 08:00-09:00 (July 31)

Sample Station	Position NAD 83 UTM	Depth m	Eh mV	Redox adjusted	Sulfide µM	Description Visual Observations, Comments
1	46.4973 / 64.6752	1.2	-185	-41.00	3400	Grey, brown, fine, coarse
2	46.4966 / 64.6752	1.0	-164	-20.00	1200.0	Grey, brown, fine
3	46.4966 / 64.6751	1.0	-164	-20.00	1200.0	Grey, brown, fine, coarse
4	46.4966 / 64.6751	1.0	-164	-20.00	1200.0	Grey, brown, fine, coarse
5	46.4966 / 64.6750	1.0	-164	-20.00	1200.0	Grey, brown, fine, coarse
6	46.4947 / 64.6623	1.1	-191	17.00	2250.0	Brown, coarse
7	46.4947 / 64.6628	0.7	-234	-30.00	381.0	Grey, brown, fine
8	46.4890 / 64.6430	1.0	-149	85.00	46.8	Grey, brown, coarse, fine
9	46.4700 / 64.7013	1.6	-254	-50.00	443.0	Brown, grey, coarse, fine
10	46.5094 / 64.6753	1.1	-184	20.00	151.0	Grey, brown, fine
11	46.5038 / 64.6755	1.0	-261	-57.00	621.0	Grey, brown, fine
12	46.4981 / 64.6757	0.5	-276	-72.00	404.0	Grey, fine, coarse
13	46.4977 / 64.6509	0.9	-102	102.00	21.6	Brown, fine, coarse
14	46.4579 / 64.6512	0.0	68	272.00	18.1	Brown, coarse
15	46.4975 / 64.6427	1.0	-308	-104.00	509.0	Grey, coarse, fine
16	46.4918 / 64.6429	1.0	-108	96.00	18.5	Brown, grey, coarse, fine
17	46.4670 / 64.7050	0.4	-160	44.00	36.5	Brown, grey, fine, coarse
18	46.5123 / 64.6793	1.2	-276	-72.00	1200.0	Black, grey, fine, coarse
19	46.5067 / 64.6795	0.2	-291	-87.00	2210.0	Black, fine
20	46.5008 / 64.6714	2.1	-130	74.00	276.0	Grey, brown, fine
21	46.4952 / 64.6716	1.5	-281	-77.00	658.0	Grey, fine
22	46.4948 / 64.6469	1.0	-160	44.00	175.0	Grey, brown, fine, coarse
23	46.4891 / 64.6471	1.2	-145	59.00	80.9	Grey, brown, fine, coarse
24	46.4606 / 64.6481	4.0	-87	117.00	46.5	Brown, coarse
25	46.4701 / 64.7054	1.2	-105	99.00	61.4	Brown, grey, coarse, fine
26	46.5005 / 64.6794	0.3	-385	-181.00	226.0	Grey, brown, fine, coarse
27	46.4950 / 64.6715	0.4	-316	-112.00	2100.0	Grey, fine
28	46.4950 / 64.6467	0.7	-300	-116.00	65.4	Brown, fine, coarse
29	46.4891 / 64.6418	0.7	-307	-107.00	276.0	Grey, brown, fine, coarse
30	46.4891 / 64.6470	0.9	-307	-99.00	24.6	Grey, brown, fine, coarse
31	46.4918 / 64.6580	0.3	-27	251.00	4.5	Brown, coarse, fine

SEDIMENT SAMPLE RESULTS

SITE: Cocagne Bay, NB

DATE: July 25-26, 2007

TIME COLLECTION: 13:00-16:00 (July 25) / 10:00-16:00 (July 26)

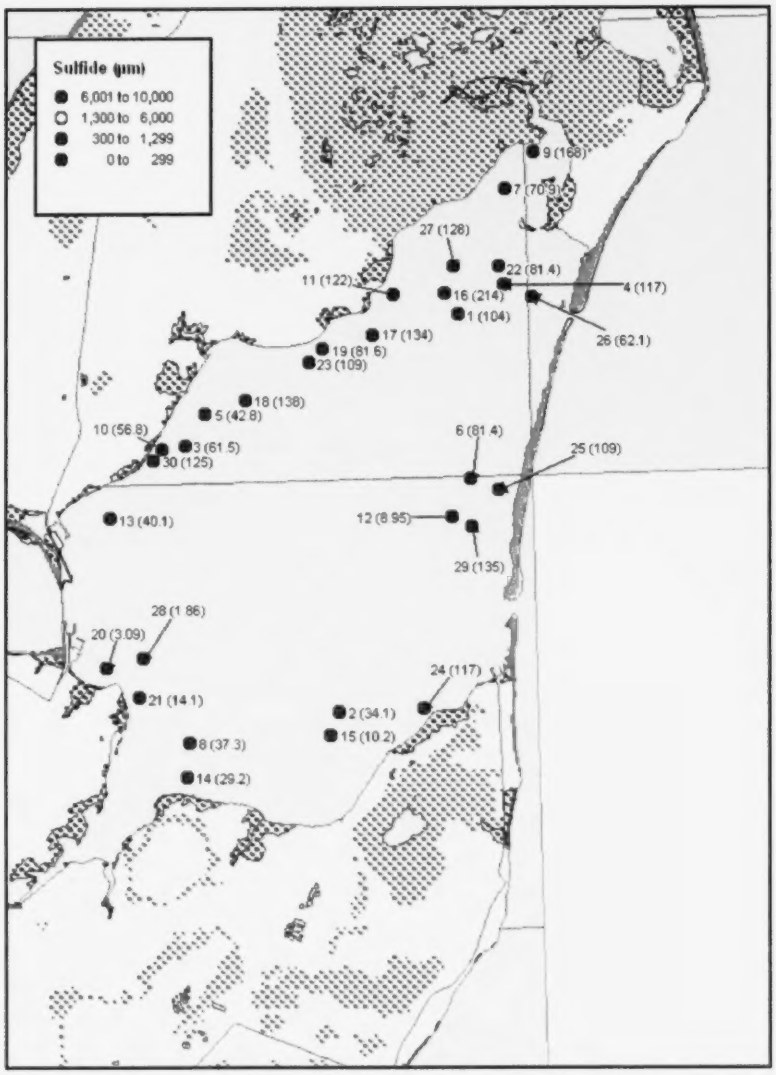
TIME ANALYSIS: Eh 13:30-16:10 (July 25) / 10:30-16:10 (July 26)

TIME ANALYSIS: Sv 17:00-20:00 (July 26)

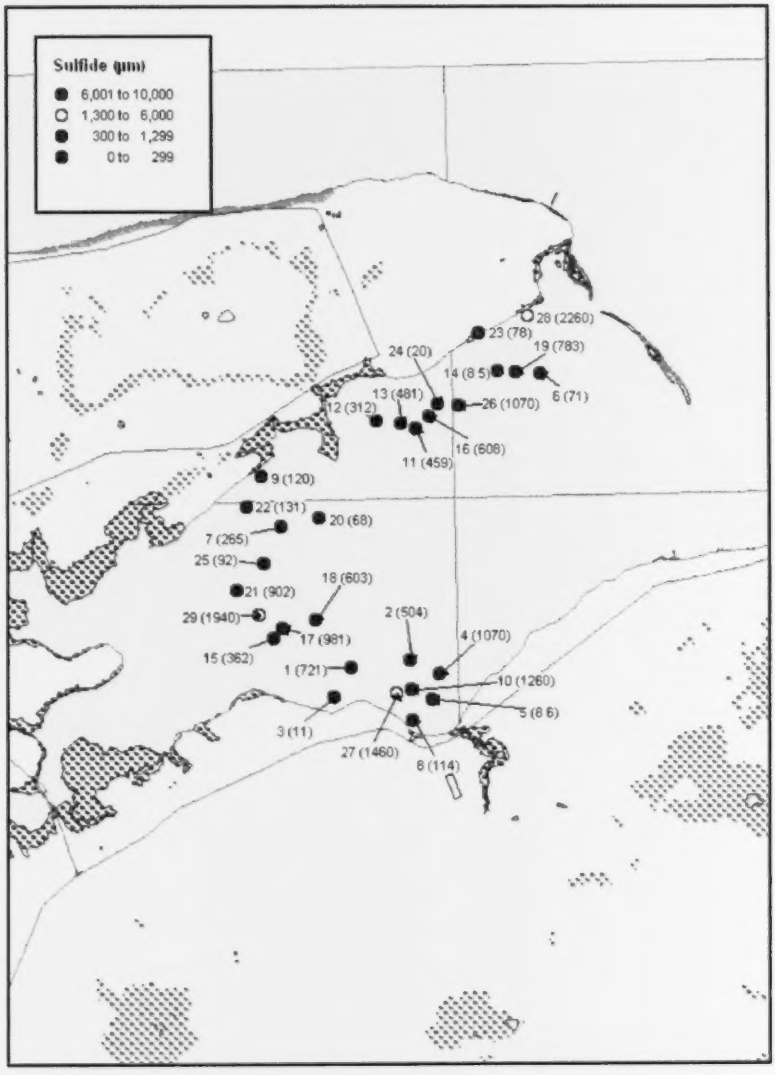
Sample #	Position (Lat. / Long.)	Depth (m)	Eh (mV)	Sv (dB re 1 µPa)	Sediment Type (Colour, Grain Size, Odour)
1	46.3720 / 64.5744	0.3	76	107.00	Brown, coarse, no odor
2	46.3720 / 64.5744	0.3	76	107.00	Brown, coarse, no odor
3	46.3720 / 64.5744	0.3	76	107.00	Brown, coarse, no odor
4	46.3720 / 64.5744	0.3	76	107.00	Brown, coarse, no odor
5	46.3720 / 64.5744	0.3	76	107.00	Brown, coarse, no odor
6	46.3308 / 64.5724	0.3	6	195.00	25.7	Brown, coarse, no odor
7	46.3476 / 64.5741	0.6	-114	67.00	98.8	Brown, grey, coarse, fine
8	46.368 / 64.6141	1.8	-243	-42.00	1760.0	Grey, black, fine, H2S
9	46.3803 / 64.5979	0.3	-71	130.00	58.3	Brown, coarse
10	46.3742 / 64.6126	1.5	-87	114.00	116.0	Brown, grey, fine
11	46.3676 / 64.5909	1.2	-231	-30.00	635.0	Grey, fine, slight H2S
12	46.3778 / 64.603	2.1	-317	-116.00	2150.0	Grey, brown, fine, H2S
13	46.3335 / 64.5734	0.6	-20	181.00	78.3	Brown, grey, fine, coarse, no odor
14	46.3974 / 64.6114	0.6	-271	-70.00	1150.0	Grey, fine, H2S
15	46.3792 / 64.5996	0.9	-107	94.00	183.0	Brown, grey, fine, coarse
16	46.3321 / 64.5793	0.3	-147	54.00	271.0	Brown, grey, fine, coarse,no odor
17	46.3711 / 64.6159	0.0	67	268.00	21.3	Brown, grey, coarse, no odor
18	46.3682 / 64.5939	1.2	-317	-116.00	1620.0	Grey, black, fine, H2S
19	46.3454 / 64.5774	1.5	-41	160.00	56.2	Brown, coarse, fine
20	46.3463 / 64.5742	0.3	32	233.00	30.9	Brown, grey, coarse, fine
21	46.3991 / 64.6119	0.6	-285	-84.00	916.0	Grey, fine, coarse, slight H2S
22	46.3489 / 64.579	1.8	-146	55.00	231.0	Brown, grey, fine
23	46.334 / 64.5802	1.5	-156	45.00	309.0	Brown, grey, fine, coarse
24	46.3707 / 64.6101	1.8	-265	-64.00	1070.0	Brown, grey, fine
25	46.3800 / 64.6078	1.2	-166	35.00	1861	Brown, grey, fine
26	46.366 / 64.6321	1.5	-61	140.00	210.0	Brown, grey, fine
27	46.6516 / 64.6?	0.6	-20	181.00	66.1	Brown, fine to coarse
28	46.592 / 64.570?	0.9	-107	94.00	183.0	Brown, grey, fine
29	46.5? / 64.5?	0.9	-?	?	?	?

Appendix B. Maps showing sulphide results for each sampling sites sampled in different estuaries along the East Coast of N.B. Sampling points are colored using the organic enrichment gradient zone. (Wildish *et al.*, 1999).

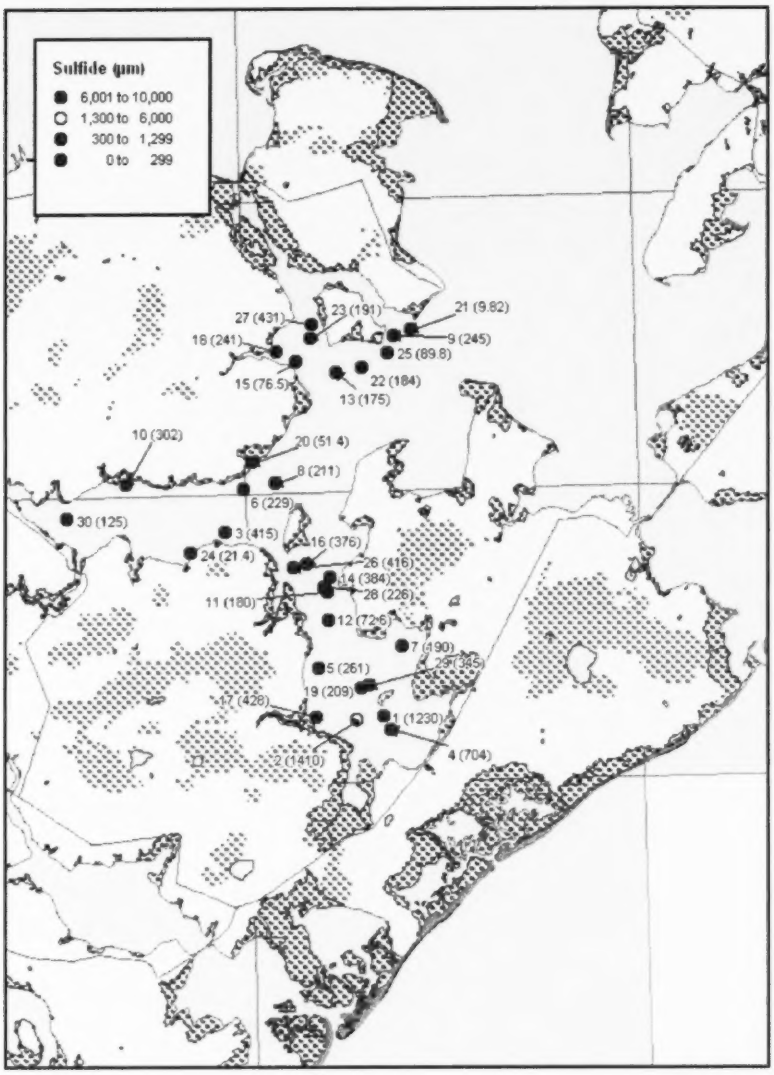
Miscou Harbour, N.B. 18
Caraquet Bay, N.B. 19
Saint Simon Bay, N.B. 20
Petite Tracadie Bay, N.B. 21
Tabusintac Bay, N.B. 22
Neguac Bay, N.B. 23
Richibucto Bay, N.B. 24
Village Bay,, N.B. 25
Bouctouche Bay, N.B. 26
Cocagne Bay, N.B. 27



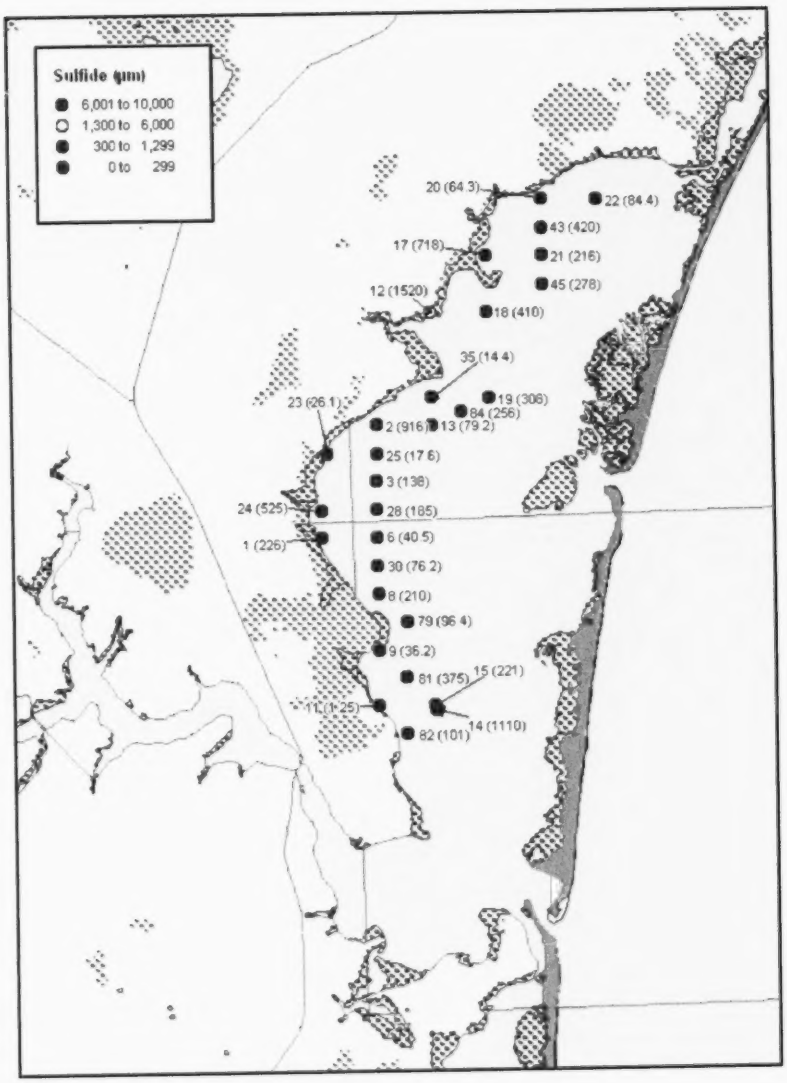
Map showing sulphide results for each sampling sites sampled in Miscou Harbour, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).



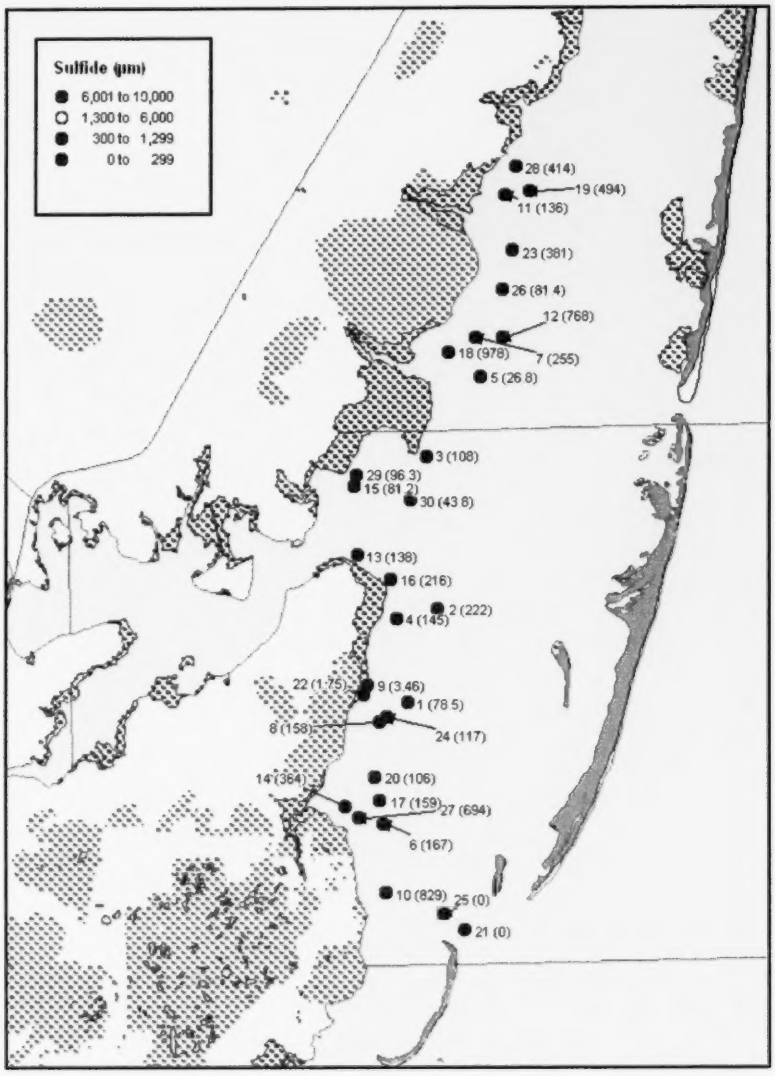
Map showing sulphide results for each sampling sites sampled in Caraquet Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).



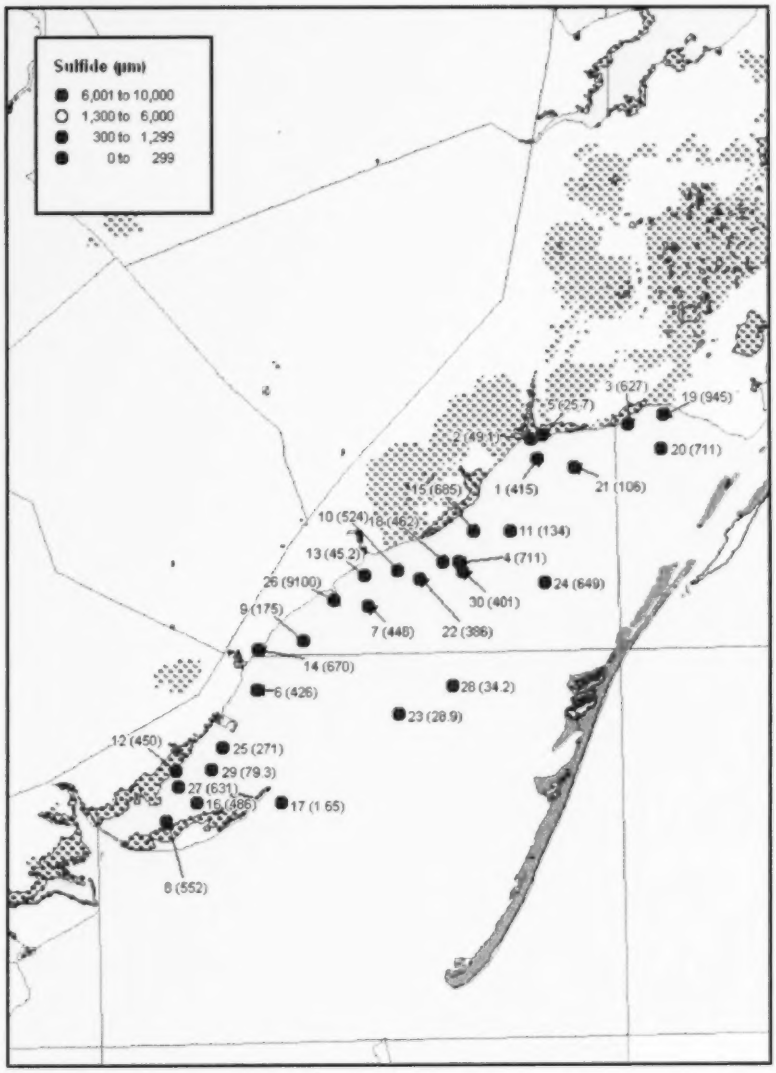
Map showing sulphide results for each sampling sites sampled in Saint Simon Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).



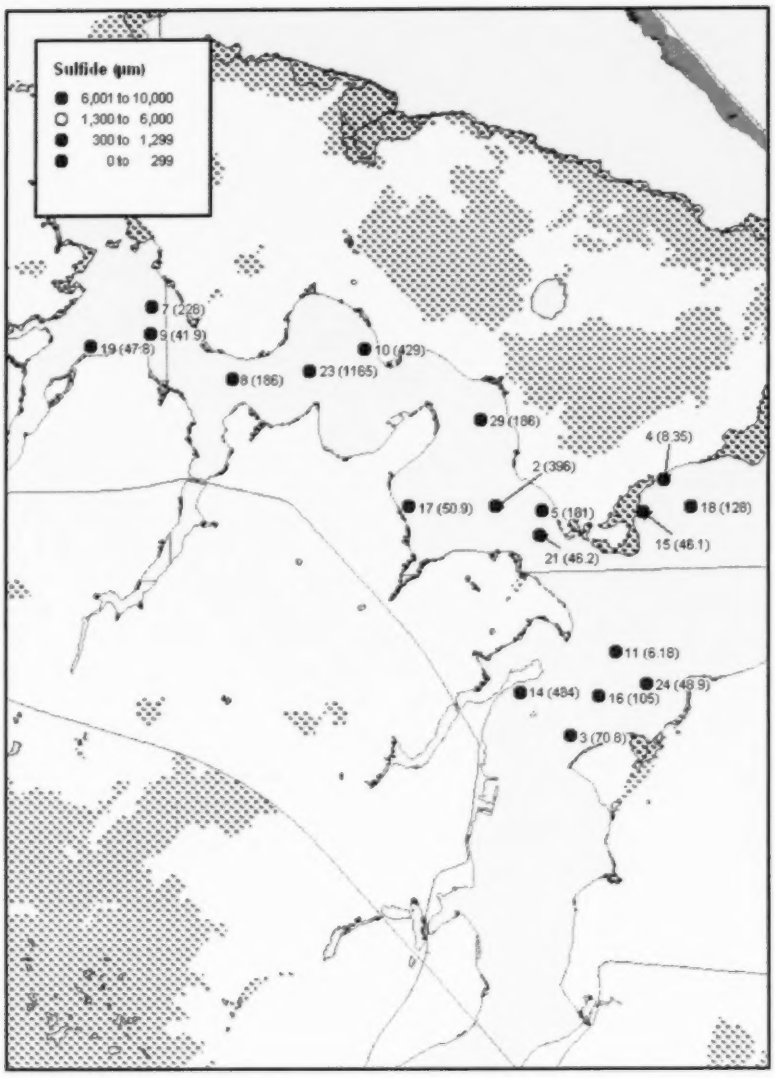
Map showing sulphide results for each sampling sites sampled in Petite Tracadie Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).



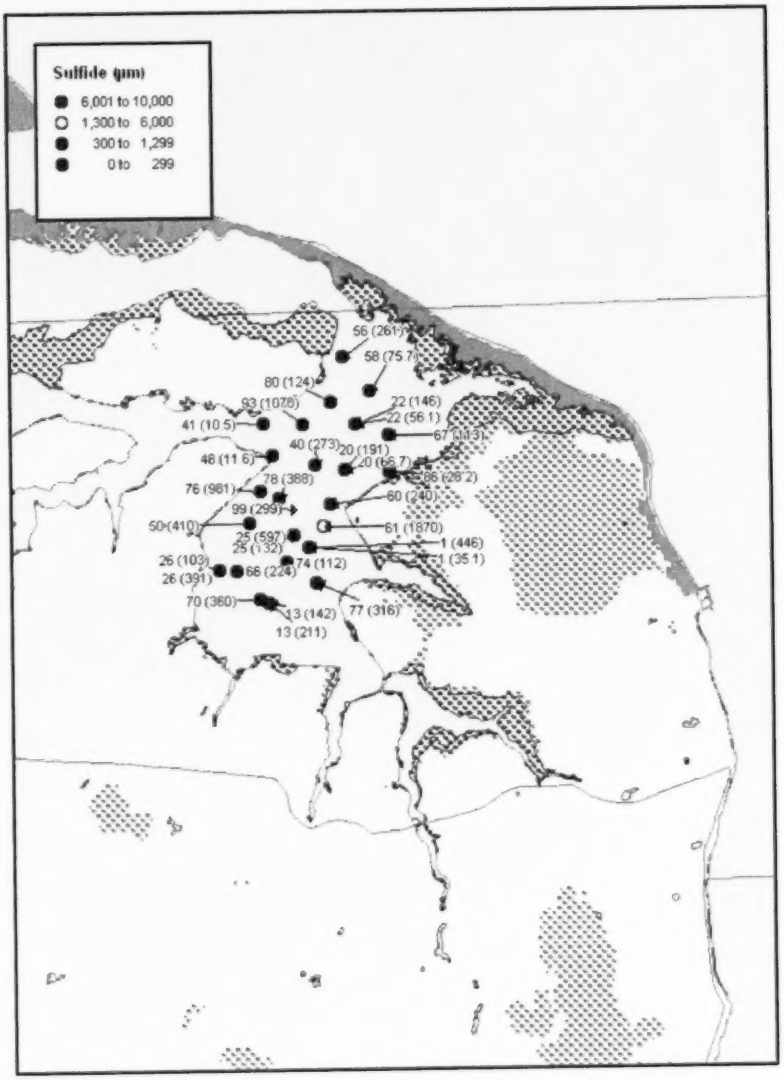
Map showing sulphide results for each sampling sites sampled in Tabusintac Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).



Map showing sulphide results for each sampling sites sampled in Neguac Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).

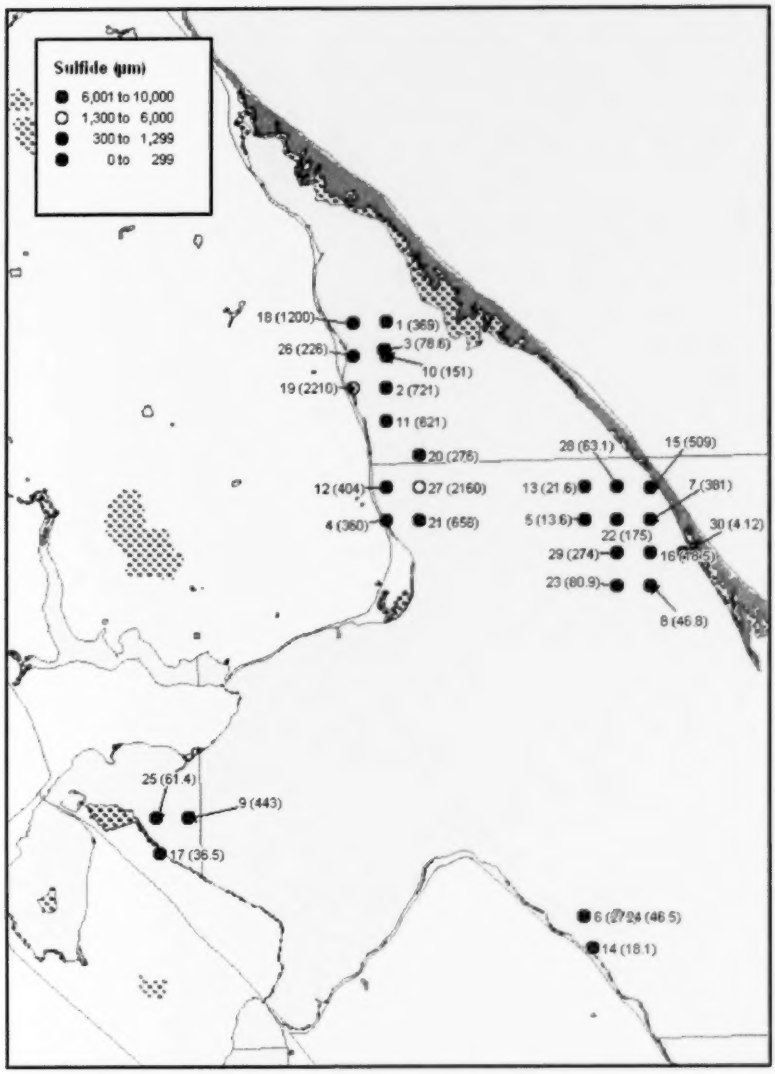


Map showing sulphide results for each sampling sites sampled in Richibucto Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).

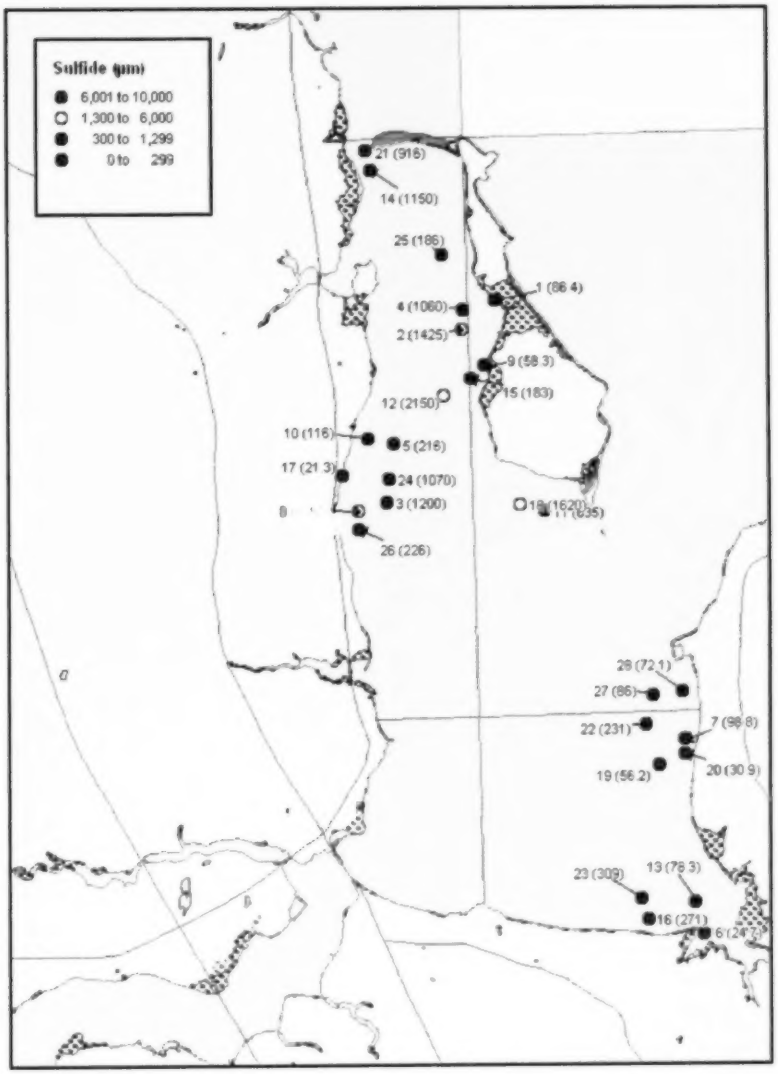


Map showing sulphide results for each sampling sites sampled in Village Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999). *

* Note some sampling point are duplicated. Two sampling have been done in the area of Village Bay, NB . One was done in 2006 and the other one done in 2010. (See Appendix A, Richibuto Bay and Village Bay)



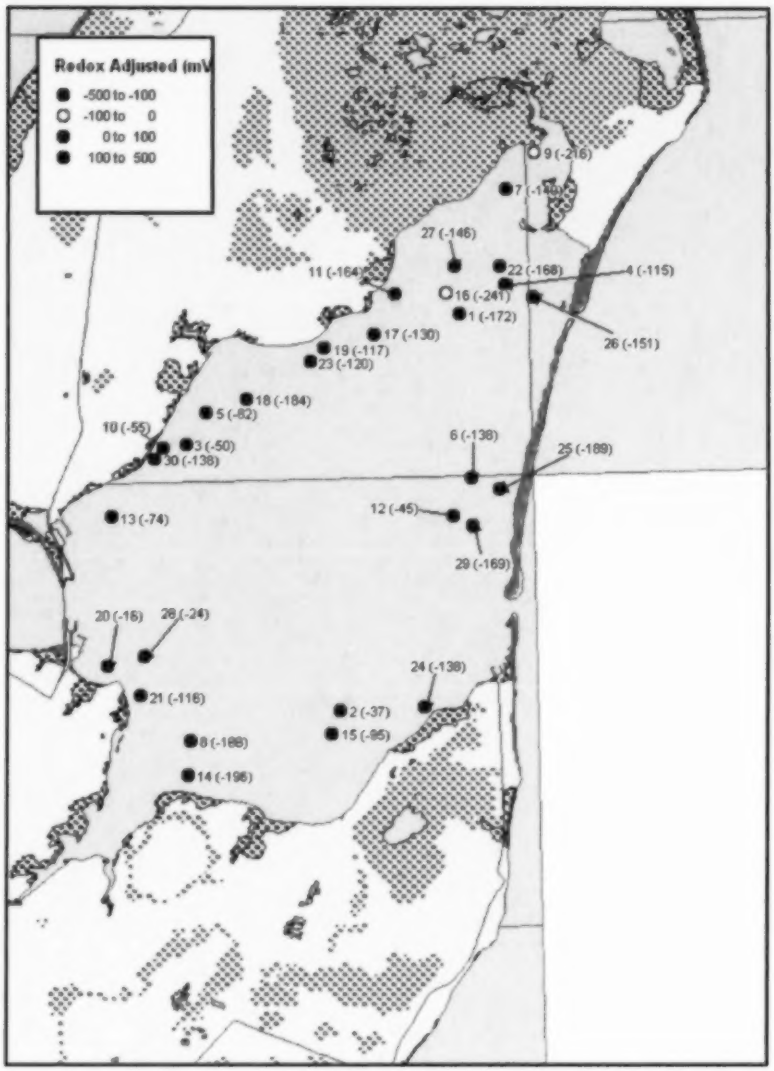
Map showing sulphide results for each sampling sites sampled in Bouctouche Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).



Map showing sulphide results for each sampling sites sampled in Cocagne Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999).

Appendix C. Maps showing adjusted redox results for each sampling sites sampled in different estuaries along the East Coast of N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

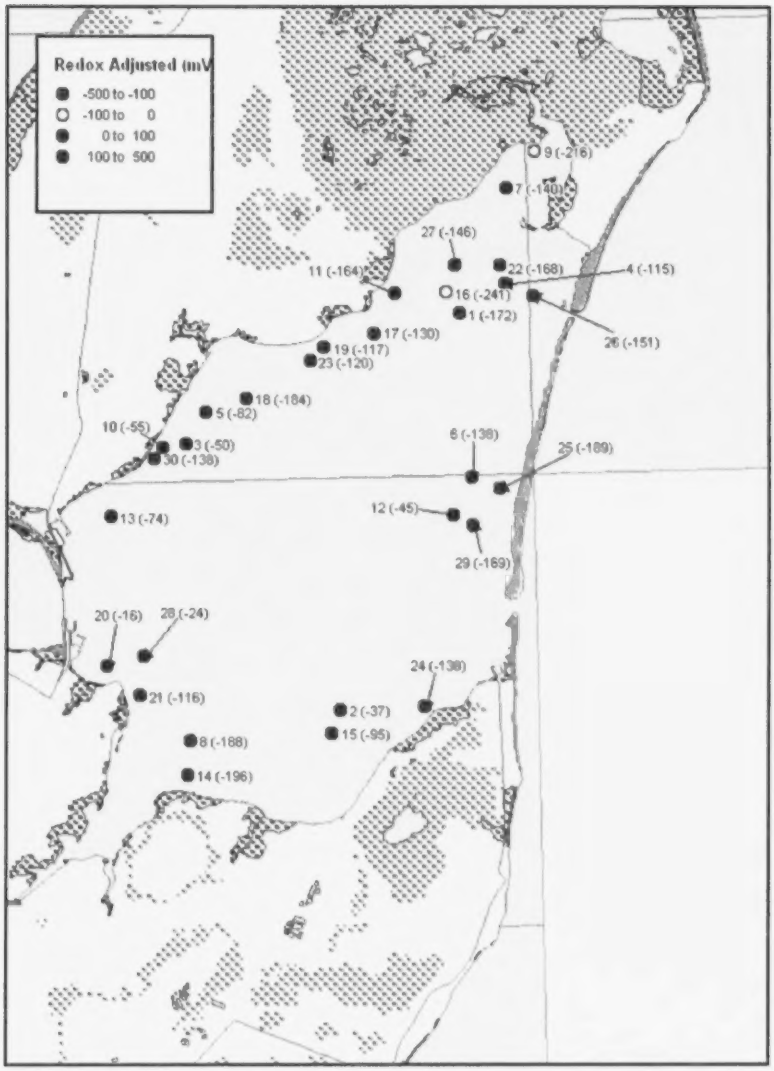
Miscou Harbour, N.B. 29
Caraquet Bay, N.B. 30
Saint Simon Bay, N.B. 31
Petite Tracadie Bay, N.B. 32
Tabusintac Bay, N.B. 33
Neguac Bay, N.B. 34
Richibucto Bay, N.B. 35
Village Bay, N.B. 36
Bouctouche Bay, N.B. 37
Cocagne Bay, N.B. 38



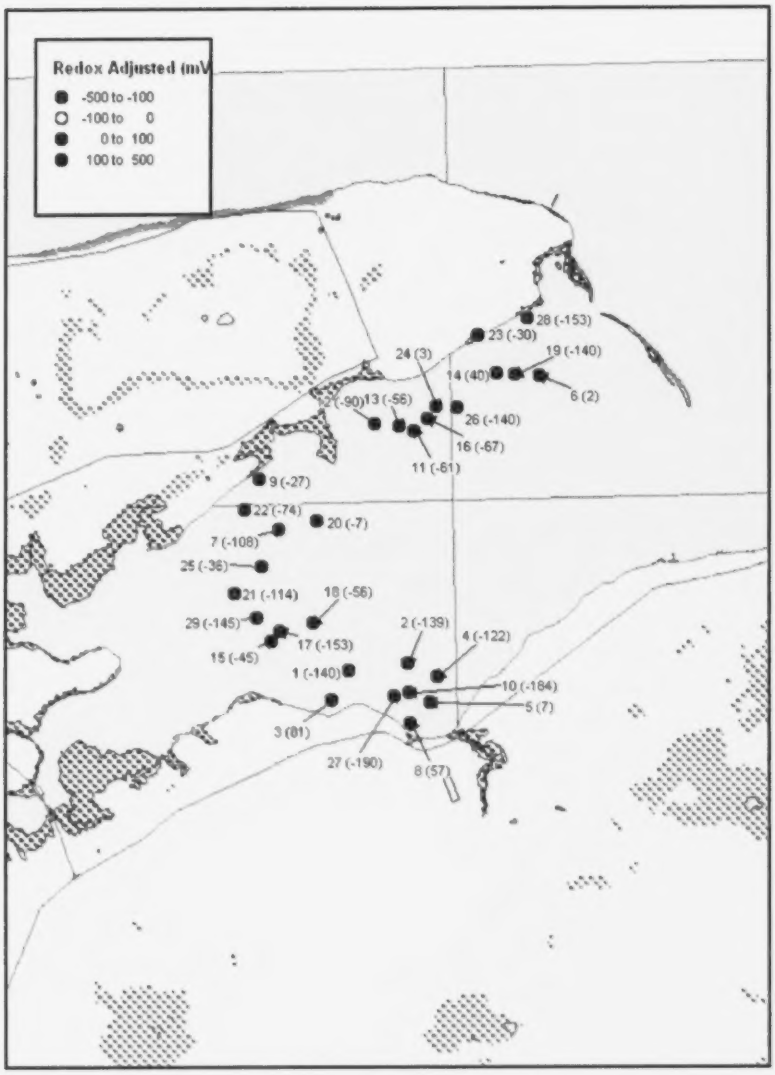
Map showing adjusted redox results for each sampling sites sampled in Miscou Harbour, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

Appendix C. Maps showing adjusted redox results for each sampling sites sampled in different estuaries along the East Coast of N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

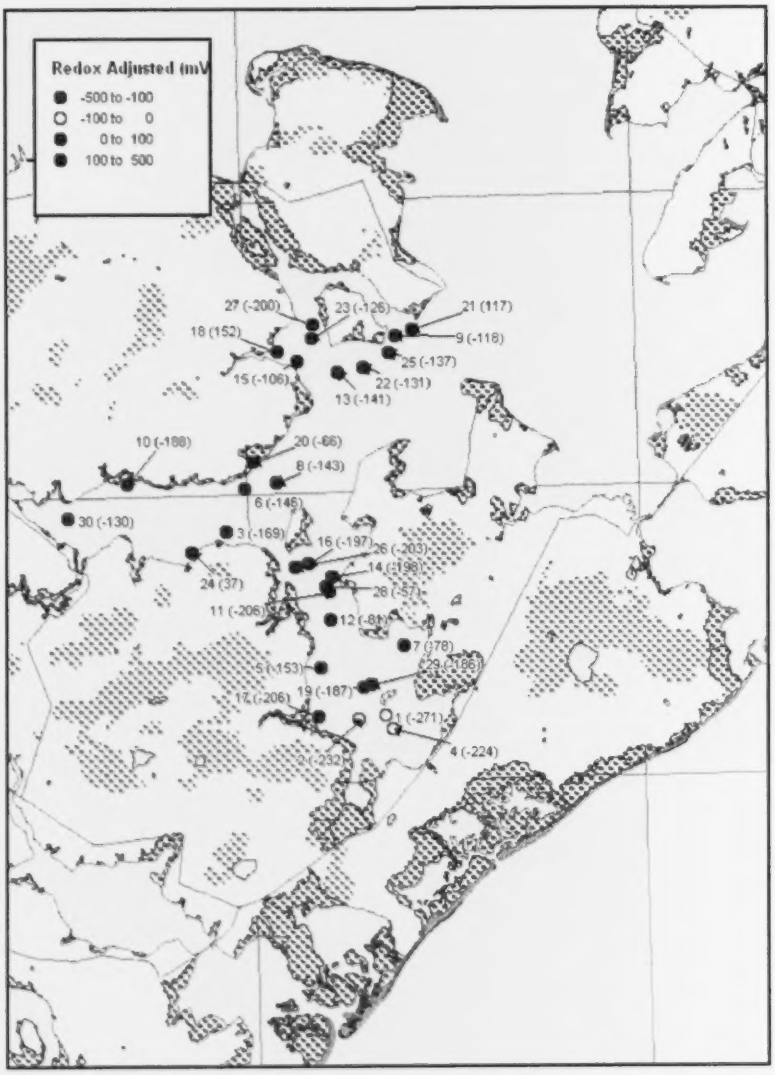
Miscou Harbour, N.B. 29
Caraquet Bay, N.B. 30
Saint Simon Bay, N.B. 31
Petite Tracadie Bay, N.B. 32
Tabusintac Bay, N.B. 33
Neguac Bay, N.B. 34
Richibucto Bay, N.B. 35
Village Bay, N.B. 36
Bouctouche Bay, N.B. 37
Cocagne Bay, N.B. 38



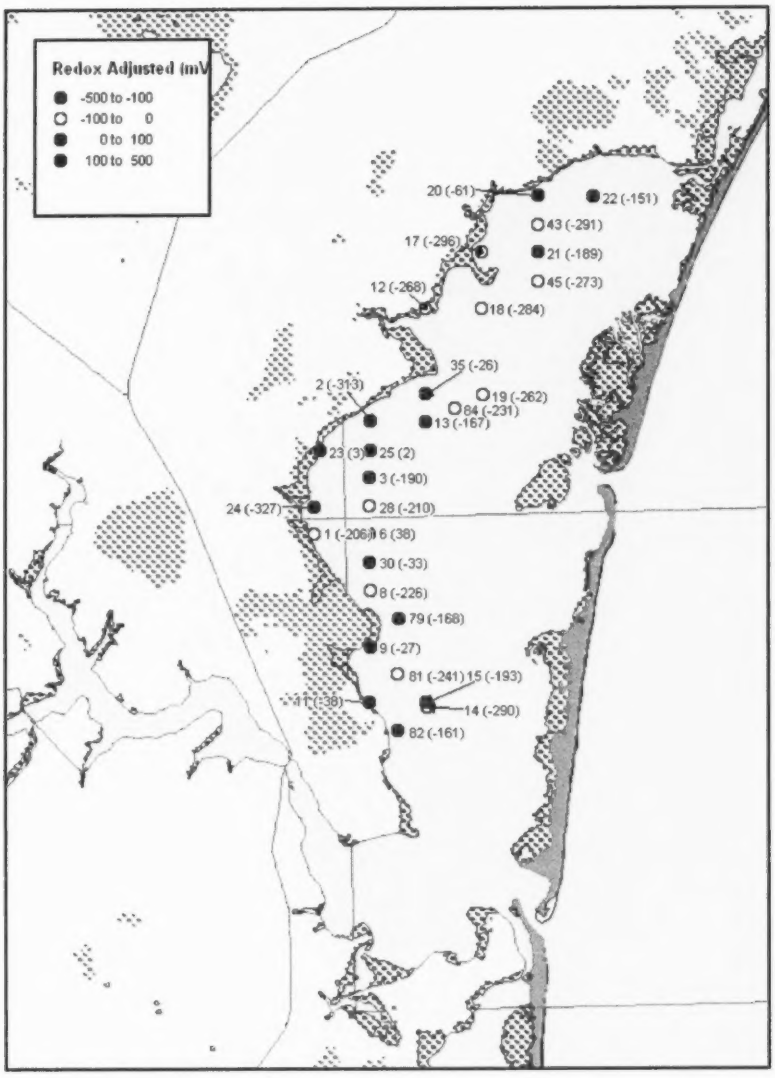
Map showing adjusted redox results for each sampling sites sampled in Miscou Harbour, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)



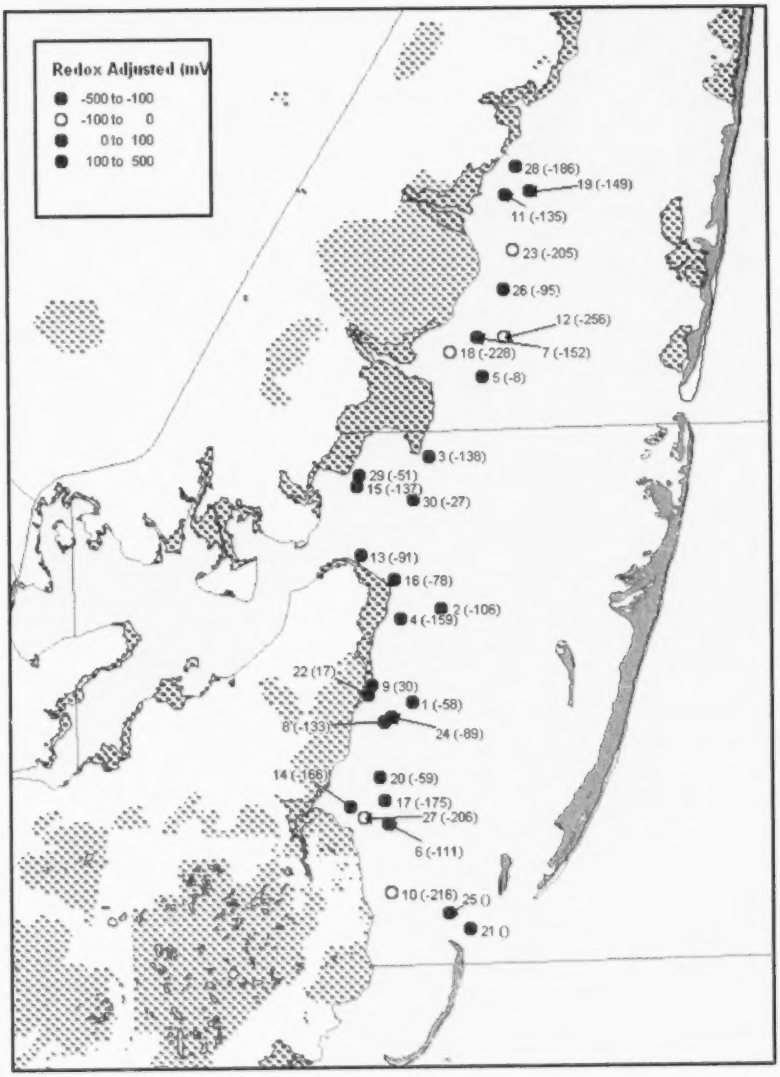
Map showing adjusted redox results for each sampling sites sampled in Caraquet Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)



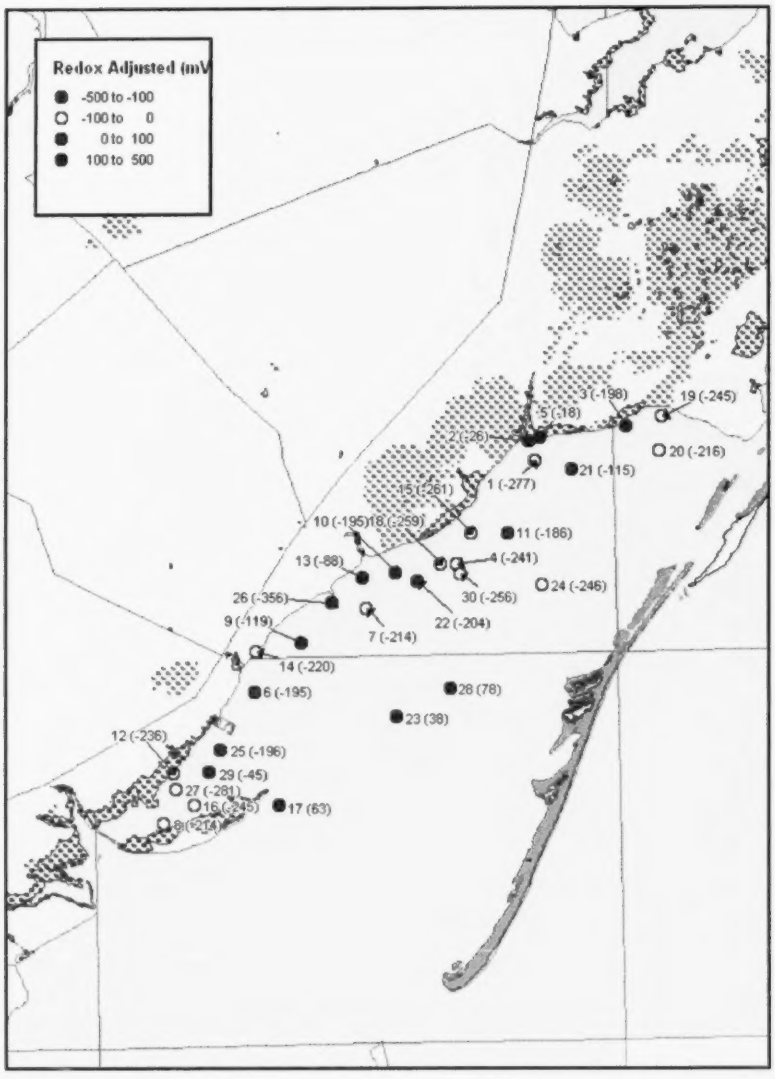
Map showing adjusted redox results for each sampling sites sampled in Saint Simon Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)



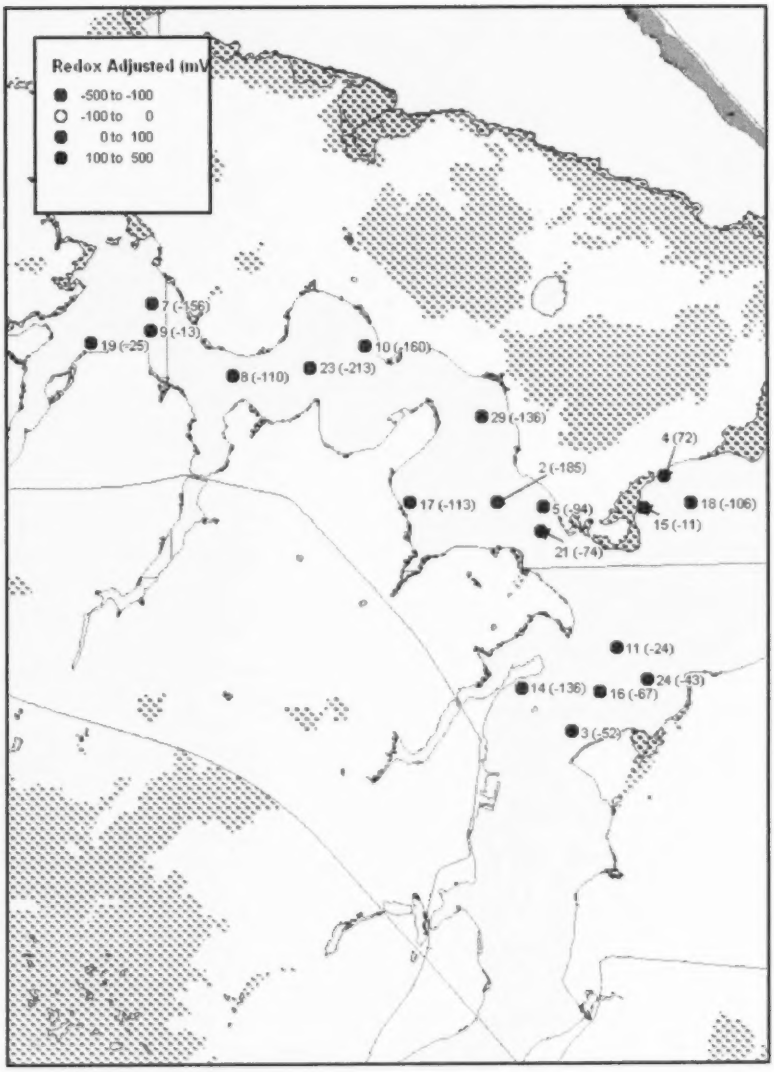
Map showing adjusted redox results for each sampling sites sampled in Petite Tracadie Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)



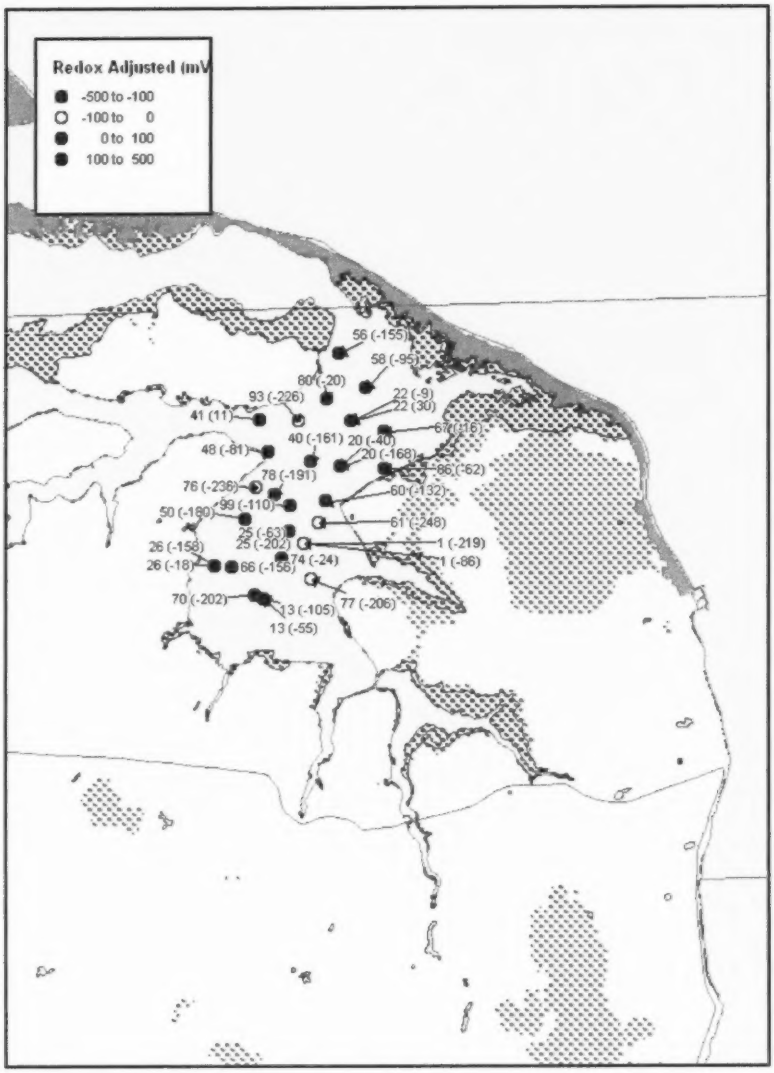
Map showing adjusted redox results for each sampling sites sampled in Tabusintac Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)



Map showing adjusted redox results for each sampling sites sampled in Neguac Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

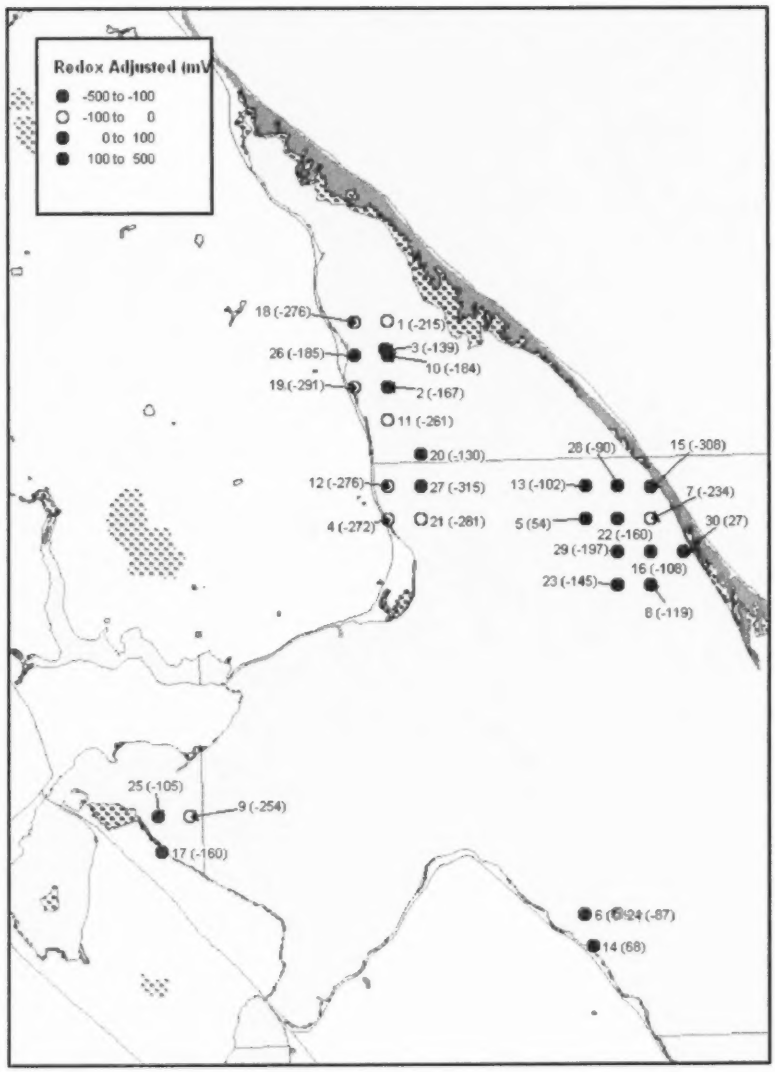


Map showing adjusted redox results for each sampling sites sampled in Richibucto Harbour, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

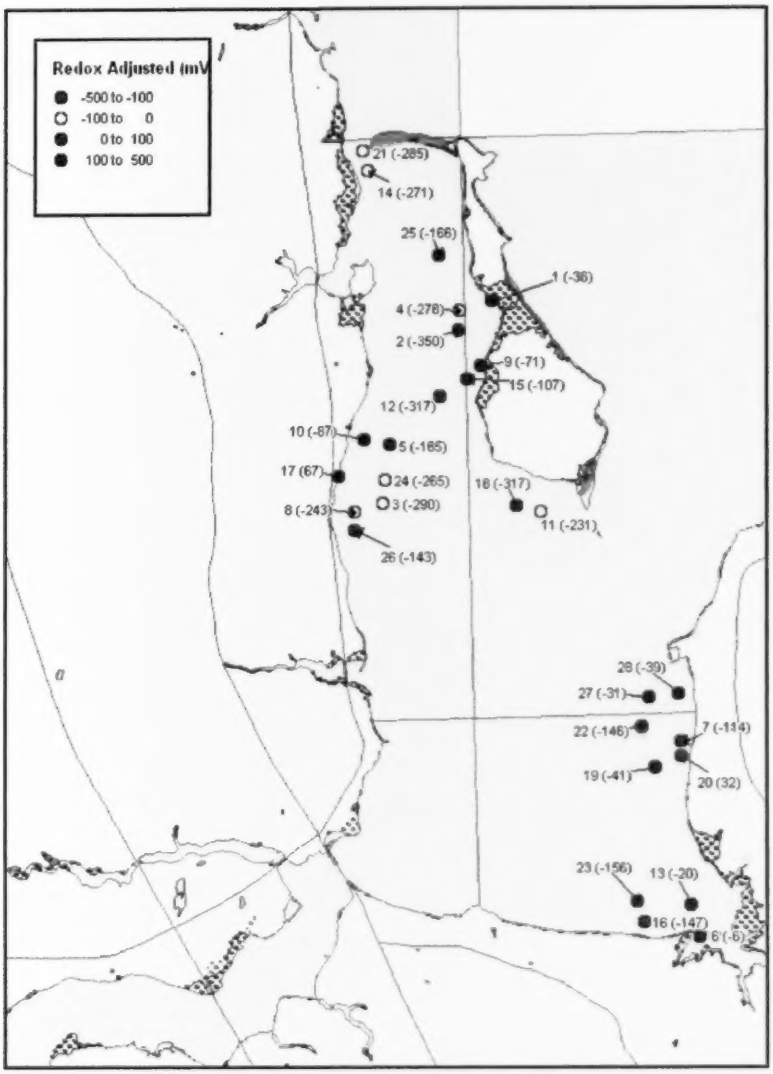


Map showing adjusted redox results for each sampling sites sampled in Village Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)*

* Note some sampling point are duplicated. Two sampling have been done in the area of Village Bay, NB . One was done in 2006 and the other one done in 2010. (See Appendix A, Richibuto Harbour and Village Bay)



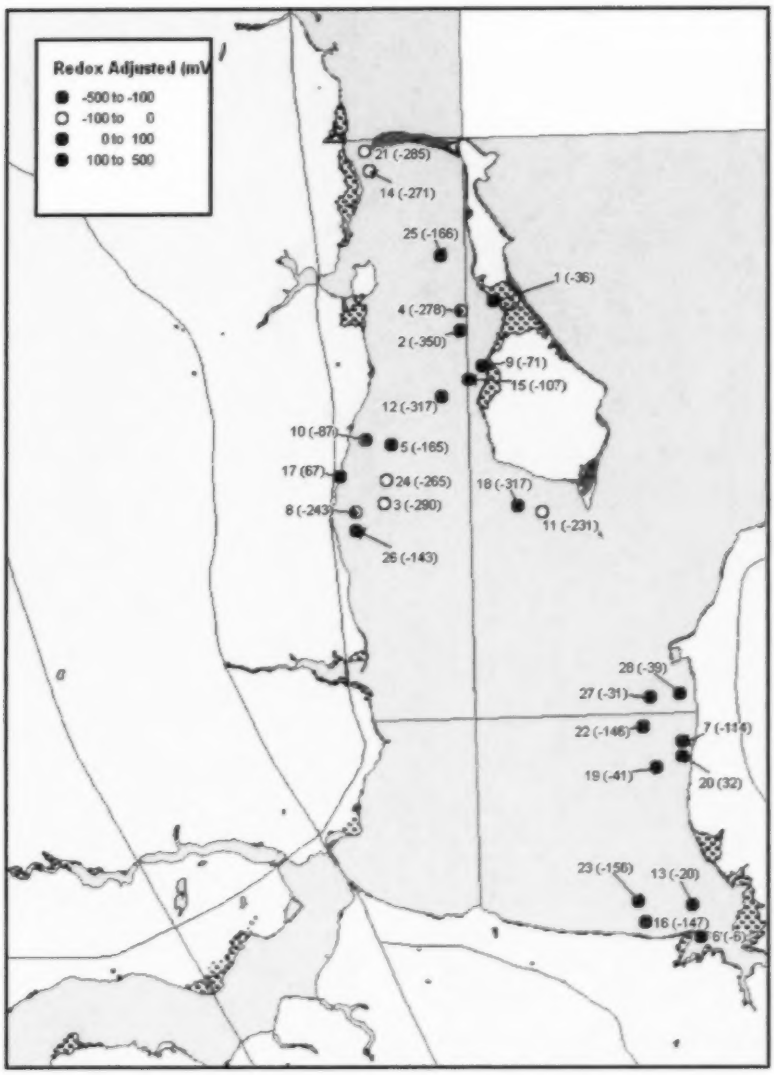
Map showing adjusted redox results for each sampling sites sampled in Bouctouche Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)



Map showing adjusted redox results for each sampling sites sampled in Cocagne Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

Appendix D. Compact Disk of underwater video of each area sampled. It contains visual observations of the sediment sampled.

Miscou Harbour, N.B. CD-6
Caraquet Bay, N.B. CD-5
Saint Simon Bay, N.B. CD-1
Petite Tracadie Bay, N.B. CD-3
Tabusintac Bay, N.B. CD-2
Neguac Bay, N.B. CD-7
Richibucto Bay, N.B. CD-1
Village Bay, N.B. CD-5
Bouctouche Bay, N.B. CD-4
Cocagne Bay, N.B. CD-2



Map showing adjusted redox results for each sampling sites sampled in Cocagne Bay, N.B. Sampling points are coloured using the organic enrichment gradient zone. (Wildish *et al.*, 1999)

Appendix D. Compact Disk of underwater video of each area sampled. It contains visual observations of the sediment sampled.

Miscou Harbour, N.B. CD-6
Caraquet Bay, N.B. CD-5
Saint Simon Bay, N.B. CD-1
Petite Tracadie Bay, N.B. CD-3
Tabusintac Bay, N.B. CD-2
Neguac Bay, N.B. CD-7
Richibucto Bay, N.B. CD-1
Village Bay, N.B. CD-5
Bouctouche Bay, N.B. CD-4
Cocagne Bay, N.B. CD-2